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Utility Analysis: Estimating the SDy Parameter for Accounting Supervisors

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UTILITY ANALYSIS:
ESTIMATING THE SDy PARAMETER FOR ACCOUNTING SUPERVISORS

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THESIS

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ABSTRACT

Personnel decisions have the potential to influence an entire organization. The effects of these decisions are more credible and relevant when quantified. Historically, benefits were defined in correlational statistics, i.e., validity coefficients. But the increasing demand is for a bottom-line or dollar-value definition. The utility concept presents a methodology for providing the dollar value impact on performance of a personnel intervention program. One parameter of a utility analysis model is the standard deviation of job performance in dollars (SDy). This research develops a SDy value for the yearly production contribution of a first level line accounting supervisor to be used in a utility model. It is the hypothesis of this paper that the resultant estimated dollar value of yearly productivity for accounting supervisors should be consistent across all organization types, indicating generalizability. Sixty Florida-based organizations were surveyed to develop the SDy estimate. The resulting SDy estimates are presented for four organization types. The results support the conclusion that the type of organization does not affect the SDy estimate. Therefore, SDy estimates can be generalized across organization types.

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TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

Every organization operates in an environment where limited resources are allocated among departments in proportion to the benefits made to the organization. The justification for these allocations is often related to the organization's bottom-line productivity or profit level. The Human Resource Management Department is "competing" for resources along with other staff and line departments. Historically, the contributions made by the personnel department have been stated in subjective, qualitative terms. However, it is increasingly apparent that, in order to stay in the forefront of the competition, personnel departments must develop quantitative cost/benefit statements of their contributions to the operation of the organization.

There are several possible criteria for judging a personnel program. One criterion is the ratio of success to non-success, i.e., the number of successful employees hired. An alternative criterion is the resultant increase (or decrease) in the average level of performance among employees.

A third alternative is the amount of savings to the organization. Any personnel intervention program needs to be examined within a cost-effectiveness context. In particular, training is a long-term investment which should have financial objectives as well as learning objectives.

Utility theory provides a framework for performing a cost-benefit analysis. Utility analysis is defined as the determination of expected institutional gain or loss anticipated to result from various courses of action (Cascio, 1979). When faced with a choice among alternative decision strategies, the strategy to be used is the one that maximizes the expected utility for the organization across all possible outcomes. Utility theory specifies evaluations by means of a payoff matrix or by conversion of the criterion to utility units (Cronbach, 1965). Marginal utility is the gain in utility represented by the use of a selection device (or any personnel intervention) beyond that found with all other programs in use by the organization (Landy, 1982). In particular, the utility of a selection device is the degree to which its use improves the quality of the individuals selected beyond what would have occurred had that device not been used (Cascio, 1980).

Many personnel decisions require consideration of seemingly non-quantifiable, non-comparable outcomes. It is difficult to place value on all the consequences of a decision, particularly as the results extend into time (Cronbach, 1965). The research on evaluating personnel intervention programs has evolved from qualitative, non-economic, value-related methods to cost-accounting models to the most recent attempts to relate personnel programs to an organization's overall productivity figures through utility models.

The non-economic value related research includes validity coefficients, the increase in the percentage of successful workers, expectancy tables, regressions of job performance measures on test scores, F and t test statistics between training and control groups

and their associated p value. The most frequently mentioned non-economic value evaluation methods are the Index of Forecasting Efficiency and the Coefficient of Determination (Schmidt, 1979).

However, none of these evaluation methods recognize that the value of an intervention varies as a function of the parameters of the situation in which it is used. In addition, they imply that only intervention devices with relatively high validity coefficients will have significant practical utility.

The cost accounting models attempt to identify and quantify, in dollar terms, every cost and benefit associated with an intervention program. Cost accounting requires a thorough understanding of direct costs and indirect costs (including development, support and general operating costs) for each program. There must be a well-documented analysis of the projected resultant savings as well as a careful comparison of planned program costs against those for alternative methods (Craig, 1979).

The major problem with a cost accounting evaluation is that not all outcomes of performance are directly observable and measurable. Inherent in any rational theory of decisionmaking is the difficulty of a monetary analysis of several diverse criteria. This model calls for reducing all criteria to a common scale but some criteria are immeasurable. This makes it extremely difficult to work out an optimum strategy based exclusively on quantifiable factors.

Initial utility model research was begun by Taylor and Russell in 1939. They examined the economic value of a selection device as it varies as a function of situational factors along with the validity

coefficient. They incorporated the validity coefficient, selection ratio and the base rate into their model.

A disadvantage to the Taylor-Russell model is that the goodness of the predictor is reflected only in terms of the success ratio. The dichotomous classification of success permits no gradation of success. The model also applies an arbitrary performance level that separates satisfactory from unsatisfactory performance (Landy, 1982).

The Naylor-Shine model, like the Taylor-Russell model, assumes that the relationship between the predictor and the criterion is bivariate, normal, linear and homeoscedastic. Naylor-Shine assumes a linear relationship between validity and utility and that this relationship holds at all selection ratios (Cascio, 1980). At any arbitrarily defined cut-off on a selection measure, the higher the validity, the greater the increase in average criterion score for the selected group over that observed for the total group. Therefore, this model is defined in terms of the increase in average criterion score to be expected from use of a selection measure with a given validity and selection ratio. However, unlike Taylor-Russell, Naylor-Shine dictates no dichotomy on criterion dimension, thus making Naylor-Shine more generally applicable.

However, neither the Taylor-Russell nor Naylor-Shine models integrate the concept of the cost of selection or dollars gained or lost into the utility index. Both simply imply that larger differences in the percentage of successful employees (Taylor-Russell) or larger increases in the average criterion score (Naylor-Shine) will yield larger benefits to the employer in terms of dollars saved.

The Brogden model (Brogden, 1950), from a cost accounting perspective, attempts to transform job performance into a dollar-based metric. His model calculates the mean gain in productivity (expressed in dollar units) per selectee resulting from the use of a selection device as compared to random selection. He stresses the importance of the standard deviation of job performance in affecting the utility of a selection procedure (Landy, 1982).

In the Brogden model, a linear regression is applied to demonstrate how the selection ratio (SR) and the standard deviation of job performance in dollars (SDy) affects the economic utility of a selection device. In addition, the formula for marginal utility (the increase in dollar value of the average performance that results from using the test) examines the difference between the mean productivity in the group selected using the test and the mean productivity in a group selected without using the test (randomly selected).

Cronbach and Gleser (1965) applied the Brogden model to more complex personnel decision procedures such as classification, placement and sequential selection strategies. This took utility theory beyond the realm of single-stage fixed job decisions. They considered selection with adaptive treatment and two-stage and multi-stage selection (Schmidt, 1979). This type of sequential decision theory represented a new scope for the field of personnel testing. Their formulas for utility were the same as Brogden's with the inclusion of the cost of testing.

Schmidt (1979) performed a study to illustrate the magnitude of productivity implications of a valid selection procedure and to demonstrate the applicability of decision-theoretic utility equations.

The research estimated the impact of a valid test (the Programmer Aptitude Test) on productivity. He developed a utility estimate for the federal government then discussed the possible implications for the national economy. He utilized a new method for estimating the SDy parameter (the standard deviation of a job performance in dollars of randomly selected employees). Historically, this parameter has been a major obstacle in developing utility estimates. The technique introduced by Schmidt in this study involved a survey of the supervisors of the position under consideration. They were requested to estimate the dollar value of the performance of an employee at a given percentile level. It is this technique that is the focus of this paper. In addition, the study attempted to test the assumption that the dollar value of employees is normally distributed.

Schmidt's findings revealed that the Programmers Aptitude Test contributed substantially to improvements in productivity. The following estimates are based on use of the test in the federal government. Dependent on the Selection Ratio and the previous procedure validity, the gains resulting from use of the test are in the millions of dollars. For example, with an SR of .05 and a previous procedure with no validity, the increase in productivity is $97.2 million. An SR of .50 and a previous procedure validity of .50 yields a gain in utility of $5.6 million.

Schmidt (1982) later applied the linear-regression-based decision theory equations (used previously to estimate the dollar impact of a valid selection system procedure) to evaluate a training program. The goal of the model was to determine the average gain in performance due to training in standard score units and convert this gain to dollars

per year. This annual dollar performance estimate of performance gain is based in part on the number taking the course as well as the cost per person of the training course. He also considers the duration of the training effect on performance. The formula for the change in utility is:

$$\Delta U = T\ N\ dt\ SDy - NC$$

where U = dollar value of training course

T = number of years duration of training effect on performance

N = number trained

dt = true difference in job performance between average trained and untrained employees in SD units

SDy = standard deviation of job performance in dollars of untrained group

C = cost of training per trainee

The estimation of the dt parameter is obtained by calculating the observed gain in performance between trained and untrained employees in standard score units. The estimation of this value is based on a quantitative review of the literature performed by King, Hunter and Schmidt (1980) which showed that the mean correlation between true score evaluations of two raters is .60 (a conservative estimate of interrater reliability). According to King et al. (1980), the best estimate for dt will not be derived from a single study but by cumulating the results of all available studies. This estimate of the interrater reliability on performance evaluations can be applied to an estimate of the calculated observed gain in performance in standard

score units. This will correct for the unreliability of ratings by two raters. For example, if the performance mean of the trained group is 55 and the performance mean of the untrained group is 50, and the standard deviation is 10 for both groups, then the observed gain in performance in standard score units is d = 55-50/10 = .50 SD. To adjust for interrater reliability, dt = .50/ .60 = .65. (Schmidt, 1982).

The SDy provides an index of variability of job performance in dollars for the incumbent employees. The procedure for obtaining a rational estimate of SDy is based on the assumption that if job performance in dollars is normally distributed, then the value to the organization of the products and services produced by the average employee and those produced by an employee at the 85th percentile in performance equals SDy. Similarly, the difference in value between the 15th and 50th percentile is also an estimate of SDy.

However, the assumption of normality is a misnomer. As indicated by Bobko (1983), the fact that the two standard deviation estimates are similar is not an adequate test of the normality assumption. The equivalence of the estimates is necessary, but not sufficient for normality (equivalence being necessary in any symmetric distribution). An alternative explanation could be a rectangular distribution where the distances from the mean are directly proportional to percentiles rather than a bell-shaped curve.

Experienced supervisors estimate the dollar value of the yearly output of employees at the three percentile points on the performance continuum, with instructions to estimate the cost of having an outside organization perform these services. As with the Schmidt (1979)

selection utility model, a carefully developed questionnaire is used to compute SDy and is averaged over supervisors to maximize reliability and accuracy.

Eaton (1985) expands on the Schmidt 1982 research by examining two alternative methods for calculating the standard deviation of job performance in dollars. He states that the methods employed by Schmidt—the SD$ Estimation Technique where job supervisors estimate the value at a given percentile and the Sales Percentage Technique—where a Schmidt-Hunter research review indicated that the SD$ typically falls between 40 and 70% of annual salary, are not always the appropriate estimates (Eaton, 1985). In some situations, this could be impractical and possibly misleading, i.e., where an employee operates complex, expensive equipment and/or is focal to productivity of a costly system. Eaton applied two alternative strategies to an existing system involving tank commanders. The Superior Equivalents Technique used estimates of how many superior students (85th percentile) would be needed to produce the output of a fixed number average (50th percentile) performers. The second alternative is the System Effectiveness Technique, which indicated that the Superior Equivalents Technique produced the best results in these situations involving tank crews. It provided consistent estimates of the number of superior performers required to equal the aggregate performance of a fixed number of performers. Eaton concludes that the estimation method used is dependent on the specific situation.

Landy (1982) proposes three research needs that will define the necessary and sufficient conditions for the application of the utility model across any performance domain. The first is descriptive

research. An elaboration on the necessary contextual conditions for the application of the utility model is needed. This can be performed through literature reviews to provide a taxonomy, and an examination of SDy across job families and job titles to create a complete survey of many types of jobs.

The second research need is testing parametric assumptions of the utility model. This includes research to determine the psychometric adequacy of the SDy parameter.

In addition, research is needed to determine how other interventions have differential effects on improvements in job performance, depending on the method used to improve performance. For example, an increase in the validity of the selection process will result in a decrease in the value of SDy and a skill-oriented training course will result in an increase in the value of SDy, if provided to all employees (Landy, 1982).

Schmidt (1982) also calls for more research which quantitatively integrates findings across studies to produce stable and accurate estimates of effect sizes (dt values) for various kinds of training interventions. Such effect sizes are crucial to the application of utility models.

It is the intent of this paper and research to examine the SDy parameter. Of all the components in Schmidt's model for calculating the change in the utility due to a training intervention, it is the most subjective and difficult to quantify.

SDy is an index of the variability of job performance in dollars in the relevant group. When evaluating organizational interventions, the relevant group is incumbent employees. By taking the difference

in dollar value of yearly productivity for a group one standard deviation to the left of the mean and comparing it to a group one standard deviation to the right of the mean, an examination of the variance will indicate if the population is symmetrically distributed.

Schmidt (1979) used a survey to estimate SDy. The questionnaire was administered to 62 supervisors to estimate the yearly production values of employees at the mean (50th percentile) and at one standard deviation in both directions. From these figures, estimates of SDy are computed and averaged over supervisors to compensate for any deviant estimates. The mean SDy is used rather than the SD of the actual dollar estimates. This eliminates the wide variability that may occur in dollar estimates (Bobko, 1983).

This method is job specific and the results acquired by Schmidt are an estimate exclusively for programming personnel. Additional research is needed to examine the universal applicability of this estimation method. Although Schmidt discusses application of the SDy estimate for government programmers to the national economy, there is little empirical research on the generalizability of the estimate across organizations.

The SDy estimate is a critical component to the utility model for calculating the dollar value of a training program. It is the hypothesis of this paper that this estimation method can be applied to any position. The resultant estimate can then be placed into a utility model and used to calculate dollar estimates for changes in productivity due to a given personnel intervention, i.e., training. In addition, it is hypothesized that a position that is common within several types of organizations will result in the same estimation of

standard deviation of job performance measured in dollars. This will enhance the generalizability of the estimate and decrease the need for organizational-specific research. A natural underlying hypothesis is that there will be no significant difference among common jobs within organization types.

The position that was examined was a first level line accounting supervisor who supervises an accounting unit of 4 to 20 non-management clerical personnel. A questionnaire was administered to the first line supervisor's immediate superior. The questionnaire required a dollar value to be assigned for the yearly output for a first line supervisor at the 85th, 50th and 15th percentiles. When averaged across all respondents, the resultant SDy should be a figure that is applicable for all accounting first line supervisors. This SDy can then be implemented into the utility model to determine the costs/benefits of a training program for this population.

METHOD

Subjects

The employees for which the standard deviation was estimated were composed of first level management personnel over a unit whose primary function is accounting. The study included subjects from a cross-section of six organization types. The organization types are Financial, Healthcare, Manufacturing, High Technology, Communication and Sales organizations. The organizations are based in the state of Florida. Surveys were sent to 10 organizations from each category. The 10 largest organizations (based on number of employees) were selected for each category of organization. Financial institutions were selected from the Dun's Business Rankings, 1986, with more than 1,600 employees using the 6000 and 6100 Standard Industrial Classification (SIC) codes. Healthcare institutions were chosen from the Florida Directory of Hospitals, using those with more than 2,000 employees. Manufacturing organizations (other than High Technology) were selected from the Florida Chamber of Commerce Directory under SIC Codes 2800, 2900, 3000, 3300, 3400 and 3600 with more than 1,140 employees. High Technology firms were chosen from the Dun's Businesss Rankings, 1986, and the Florida Chamber of Commerce Directory under SIC codes 3600, and 3800 with more than 900 employees. Communication organizations were selected from the Dun's Business Rankings, 1986, and the Florida Chamber of Commerce Directory under SIC codes 2700 and 3600 with more than 1,350 employees. Sales organizations were chosen

from the Dun's Business Rankings, 1986, with more than 2,400 employees, using SIC codes 5000 through 5999.

The accounting function considered included accounts receivable, accounts payable, payroll, revenue, asset management and general ledger. The job title "accounting supervisor" was defined to ensure that similar positions were surveyed for all respondents. The position was defined as being responsible, through subordinates, for the receipt, processing, payment and/or journalization of accounting information. The supervisors had from 4 to 20 non-management clerical subordinates. It was anticipated that each organization would have multiple accounting units, and therefore supervisory teams, thereby resulting in multiple responses from each organization. Four surveys were sent to each organization, producing a total distribution of 240.

Procedure

The information was attained through a survey. Four surveys and a cover letter were mailed to the Controller/Chief Financial Officer of each organization. The cover letter (Appendix A) identified study objectives. Confidentiality and anonymity were ensured. Each survey was designated by organization type prior to distribution by labelling each survey according to organization type. The Controller had the option to request a summary of the survey results. The Controller was requested to forward the survey to the first level accounting supervisor's immediate superior. An outline for an internal memo from the Controller was provided (Appendix B). The survey asked the managers (the person to whom the first level accounting supervisor reports and is evaluated by) to estimate the value in yearly production of a given performance-level employee. As a guideline, the

managers were asked to estimate the cost to the organization of having an outside consulting firm provide the products and/or services that are currently provided by the line accounting supervisor.

The survey was modeled after the survey developed by Schmidt et al. (1979) for GS9-11 computer programmers. Minor modifications were made to improve the survey's applicability to this research.

> The dollar utility estimates I am asking you to make are critical in estimating the relative dollar value to your organization of different personnel intervention methods. In answering these questions, you will have to make some very difficult judgements. I realize that they are difficult and that they are judgements or estimates. You will have to ponder for some time before giving each estimate, and there is probably no way you can be absolutely certain your estimate is accurate when you do reach a decision. But keep in mind three things:
>
> > (1) The alternative to estimates of this kind is application of cost accounting procedures to the evaluation of job performance. Such applications are usually prohibitively expensive.
> >
> > (2) Your estimates will be averaged in with those of other managers of accounting supervisors. Thus errors produced by too high and too low estimates will tend to be averaged out, providing more accurate final estimates.
> >
> > (3) The decisions that must be made about personnel intervention methods do not require that all estimates be accurate down to the last dollar. Substantially accurate estimates will lead to the same decisions as perfectly accurate estimates.
>
> Based on your experience with accounting supervisors, I would like for you to estimate the yearly value to your organization of the products and services produced by the average first level accounting supervisor of a unit of four to twenty non-management, entry-level clerical personnel. Consider the quality and quantity of output typical of the average line accounting supervisor and the value of this output. In placing an overall dollar value on this output, it may help to consider what the cost would be of having an outside firm provide these products and services.
>
> > Based on my experience, I estimate the value to my organization of the average first level line accounting supervisor at _____ dollars per year.

I would now like for you to consider the "superior" accounting supervisor. Let us define a superior performer as a supervisor who is at the 85th percentile. That is, his or her performance is better than that of 85% of his or her fellow accounting supervisors, and only 15% turn in better performances. Consider the quality and quantity of the output typical of the superior supervisor. Then estimate the value of these products and services. In placing an overall dollar value on this output, it may again help to consider what the cost would be of having an outside firm provide these products and services.

> Based on my experience, I estimate the value to my organization of a superior first level line accounting supervisor to be _____ dollars per year.

Finally, I would like you to consider the "low performing" accounting supervisor. Let us define a low performing supervisor as one who is at the 15th percentile. That is, 85% of all first level line accounting supervisors turn in better performances than the low performing supervisor, and only 15% turn in worse performances. Consider the quality and quantity of the output typical of the low performing supervisor. Then estimate the value of these products and services. In placing an overall dollar value on this output, it may again help to consider what the cost would be of having an outside firm provide these products and services.

> Based on my experience, I estimate the value to my organization of the low performing first level line accounting supervisor at _____ dollars per year.

The survey was introduced within the organization by the Controller or a representative of the Controller's organization. It was to be filled out by an individual occupying a management level higher in the organizational hierarchy than the survey subject, a first level line accounting supervisor. This was intended to provide the research with an organizational sanction, thereby enhancing response rate. However, the internal memo accompanying the survey indicated that participation was voluntary and responses would be anonymous and confidential. Four surveys were distributed to 10 organizations of each of the six organization types, totaling 240

surveys. The cover letter to the Controller as well as the internal memo provided a contact telephone number for any questions. Surveys were marked prior to distribution with an indication of organization type to facilitate subsequent analysis. Follow-up telephone calls were made to the Controllers to remind them to return the survey.

Prior to implementation, the survey was administered to a pilot group of managers of line accounting supervisors. Seventeen pilot surveys were distributed to the accounting operation of a large telecommunication organization. Four surveys were returned. Completion time ranged from 5 to 20 minutes. Two of the four respondents indicated a zero value for a supervisor at the 15th percentile. A comment explaining this indicated that a low ability supervisor is often "more hindrance than help." Other comments related to constraints made by the organization on salary levels. The organization involved in the pilot bases compensation level primarily on length of service. There were no comments made on the actual methodology of the survey. Therefore, no revisions were made to the survey format. However, there was significant reluctance to grant permission to conduct the pilot research.

RESULTS AND DISCUSSION

Table 1 summarizes the respondents. A total of 26 responses were received for an 11% response rate out of the 240 surveys distributed. However, this is an underestimate since it was not anticipated that each of the 60 organizations surveyed would have sufficient accounting units to provide four responses. Two respondents in the High Technology category telephoned their intent to not complete the survey. One High Technology survey was not used because it was incomplete. The Healthcare and Manufacturing organizations were eliminated from the analysis due to insufficient responses. The resultant sample population used for data analysis was 21.

Table 2 details the survey results by organization type. The estimates in the table are the averages of the SDy estimates provided by the respondents. Using the mean of the SDy estimates controls the random errors, idiosyncratic tendencies and biases of individual experts (Schmidt, 1979).

The use of these differential percentage estimates is based on the underlying assumption that job performance in dollar terms is symmetrically distributed.

TABLE 1

SUMMARY OF SURVEY RESPONDENTS

Organization Type	Quantity of Surveys Returned
Financial	5
Health-Care	1
Manufacturing	1
High Technology	5
Communication	8
Sales	3

TABLE 2

SURVEY RESPONSE BY ORGANIZATION TYPE

Org Type	50th-15th Mean/Std Err		85th-50th Mean/Std Err		t-test t	p	Overall Mean Mean/Std Err	
Financial	8600	3356	8400	1631	.05	.91	8500	2485
High Tech	46100	25056	39540	20964	.20	.83	42820	22848
Commun	32125	10302	40750	22560	.35	.73	36438	13731
Sales	8000	1528	11667	4410	.79	.48	9834	1590
All Types	26405	7487	28605	10017	.18	.84	27505	7821

The use of these differential percentage estimates is based on the underlying assumption that job performance in dollar terms is symmetrically distributed. The differences between the 15th and 50th percentile and the 50th and 85th percentile were calculated. The values were averaged for all respondents. A matched groups t-test was

performed on the estimates to determine if the differences between the two means are statistically significant. Statistical significance is defined as a probability of less than .05 that the results would be the same as a result of sampling error. For all four categories of organizations, there are no significant differences between the SDy estimates for the 50th-15th percentile estimate and the 85th-50th percentile estimates.

These results indicate that there are no statistically significant differences between these two estimates that are found to the right and to the left of the mean of the distribution. Therefore, the hypothesis that the productivity in dollars for accounting supervisors is symmetrically distributed can be accepted. This is also true of the across-organization results.

The standard error of the mean can be used to determine a range of estimates that will include 90% of the estimates. For example, the mean SDy for Financial Organizations is $8,500 and the standard error of the mean is $2,485. The interval $6,015-$10,985 should contain 90% of SDy estimates.

A one-way analysis of variance was performed on the survey results. These results are summarized in Table 3. The Between-Group source of variance examines the degree of variability in the SDy estimates between the different types of qualitative independent variables (the four organization types). As indicated in Table 3, there were no significant differences between the means of the four organization types. Therefore, the organization type has no effect on

the estimation of the SDy parameter and the null hypothesis cannot be rejected.

TABLE 3

ONE-WAY ANALYSIS OF VARIANCE OF ORGANIZATION TYPES

Source of Variance	Sum of Squares	df	Mean Square	F Value	p
A Between Org. Types	4,553,876,000	3	1,517,958,656	1.22	.33
S/A Within Org. Types	21,137,840,000	17	1,243,402,000		

IMPLEMENTATION OF FINDINGS

The average productivity estimate of $27,505 can be implemented into the 1982 Schmidt model. For example, if the duration of a training course (T) is estimated at 2 years, the number of employees to be trained (N) is 100, the true difference in job performance between average trained and untrained employee in SD units (dt) is .65 and the cost of training (C) is $500, the results are:

$$\Delta U = T\ N\ dt\ SDy - NC$$

$$\Delta U = 2\ (100)\ (.65)\ (27505) - 100\ (500)$$

$$\Delta U = \$3,525,650$$

This means that the change in utility resulting from an implementation of this given training intervention will increase the company's productivity over $3.5 million.

When faced with alternative training programs for accounting supervisors, the personnel administrator can determine which program will provide the greatest benefits to the organization. This information will also provide useful information to upper management when determining budget allocations. A return on investment can be directly calculated when personnel programs are presented in these quantitative terms.

These results also provide a strong marketing tool for training organizations. Internal training programs can use it to justify programs. External training consultants can use it for marketing purposes. However, it must be presented within the framework of

maximizing positive outcomes for the organization and not merely to increase Human Resource Management's proportion of the budget expenditures. Since the results of this study indicate that the organization type does not have a significant effect on SDy estimates for first level accounting supervisory positions, there is no need to adjust the estimate based on organization type. This research supports the hypothesis of the generalizability of the SDy estimate for the similar job of first level accounting supervisor across organization types.

CONCLUSION

There is additional research that can be conducted to determine the psychometric adequacy of the SDy parameter, using first level accounting supervisors as the subject group. Cost accounting methods could be used to assign dollar values to various jobs. This would consider factors such as average value of production or service units, quality of objects or services produced, overhead, cost of errors, support costs and goodwill (Cascio, 1982). These estimates can be expanded to fit the levels of performance for a job similar to the three percentile levels used in the Schmidt survey method. These results can be correlated with the results of this research. Correlations could also be performed between the 50th percentile estimates derived from the survey and the midpoints of the actual salary ranges for accounting supervisors (Landy, 1982).

Research can be done on improvements to the Schmidt-Hunter survey method. Bobko (1983) extended the percentiles out to include two standard deviations. It was anticipated that this would result in higher estimation accuracy. The results indicated that inclusion of a 97th percentile estimate did not improve the accuracy of the SDy estimate. However, they did recommend a methodological change to ensure that respondents are on the right track. Initial surveys are distributed, requesting a 50th percentile estimate. These results are averaged and then fed back to the respondents for estimation of the

15th and 85th percentiles. Bobko states that this will decrease spurious variation due to initial scale differences.

Boudreau (1983a) presents the argument that the Schmidt model is deficient because it does not consider the elements of variable costs, taxes and discount rates of money. The result is an upwardly biased utility estimate. Boudreau recommends that the model incorporate an SDy parameter that considers the change in sales, value and service costs. In addition, the model, including the SDy parameter, will be impacted by the future value versus the present value of money.

The SDy estimate obtained through the survey method can be correlated with the results of other methods of obtaining the estimate. For example, Cascio (1982) outlines the CREPID method which is based on the salary received by an employee. The method breaks down the job into principal activities and assigns a proportional amount of the annual salary to each principal activity. The employee's supervisor then rates each employee's job performance on each principal activity. Hypothetically, the SDy estimate developed using the CREPID method should be positively correlated with the Schmidt 1982 method, using the percentile method. It has been reported that survey respondents prefer the CREPID method because it is based on job analysis and appraisal methods. Survey respondents felt more comfortable with CREPID (Day, 1986). Research by J. Frederick at S.D. Johnson and Sons, Inc. indicated that the CREPID estimation method was more "do-able" (Frederick, 1986).

The estimation of the dt variable is another parameter that is difficult to quantify. It is defined by Schmidt (1979) as the true

difference in job performance between an average trained and untrained employee in SD units. As previously stated, there is a need for more integrative studies to produce stable and accurate estimates of effect sizes (dt values) for various kinds of intervention programs (Schmidt, 1979).

Most of the variables in the utility model are job specific. Much more research is necessary to be able to develop a taxonomy of these model components.

A reliable estimate of the standard deviation of the dollar value of yearly job performance will enhance the predictive ability of the utility model. Personnel interventions can be more quantitatively evaluated in terms of their contribution to the productivity of the organization. It is this author's contention that there will never be 100% accuracy in developing quantitative estimates on qualitative variables. However, the usefulness of the utility model is not contingent on 100% precision. The decisionmaking process often needs to know only the break-even point. This is also often the case in quantitative estimates in the fields of accounting, finance, marketing and production.

Boudreau (1984) contends that the emphasis should be placed on identifying the break-even values that are essential to the decisionmaking process. The marginal return on improved estimation precision should be evaluated. If the increased accuracy is not sufficient to alter the decision, then it is unnecessary. This is even more salient when the additional costs of increased precision are considered. Historically, utility analysis has placed emphasis on the

estimation of utility values. Boudreau recommends that the use of utility analysis as a decisionmaking support tool is equally important. Break-even analysis can identify the minimum "conservative" parameters. For example, if the choice is between a selection procedure and random selection, the utility model can be set equal to zero, the break-even point. The question is what value of SDy is needed in order to produce a positive change in utility. With the other parameters known, the equation can be solved for SDy. A rough comparison of this break-even SDy to an instinctual, "true" SDy estimate may indicate immediately if a personnel intervention should be adopted. If the break-even SDy is $5.10, there should be an intuitive response to whether or not the "true" SDy exceeds $5.10 per year. The results of this research have provided an estimate of SDy for accounting supervisors that can be used for comparison purposes. Rather than expend the resources to refine this figure, the use of a break-even analysis may produce more expedient and less costly results. By determining the break-even point for a given intervention, the change in SDy due to the intervention can be compared to the results of this research. The decision to be made may be obvious to the decisionmaker, thereby removing the need to improve the accuracy of the SDy estimate. This places the emphasis on the resultant decisions rather than the perfecting of the model just for the sake of research. Boudreau (1984) recommends a taxonomy of break-even values.

The research conducted for this study supports Boudreau's argument for the break-even analysis. The small sample size prohibits any generalizability of results to the population. The variability of the

estimates makes it difficult to apply any SDy estimate with 100% confidence. A more reliable estimate might have been attained with a greater expenditure of resources. However, it is debatable if the additional precision and its marginal usefulness would justify the additional cost.

The purpose of utility research is to provide management with accurate estimates of the dollar gains in productivity of alternative training (and other personnel interventions) strategies. Such information will facilitate the "sale" of training programs to management. It will also serve as a guide to training specialists in adjusting their interventions to make them more attractive from a cost/benefit standpoint. Utility analysis serves as a communication device to improve discourse between decisionmakers. This is accomplished by providing explicit decision values, assumptions and process. Additional goals and objectives include improved consistency in decisionmaking and improved efficiency in information gathering (Boudreau, 1987).

Therefore, it is important that researchers retain sight of their purpose in developing and applying utility analysis. Utility analysis should be seen as a scientific tool in a management decisionmaking support system. Any research performed for an organization should be initiated by asking the decisionmakers what type of information is required. The utility model should then be adjusted to attain that end. The needs and the motivation of the decisionmakers should drive the development of the utility analysis and not vice versa.

It is generally the opinion of the business community that personnel psychology is a diversion rather than a contributing discipline with respect to management of an organization. Utility analysis represents an opportunity to respond to the operating executives' demands for an estimate of the expected costs and benefits of personnel programs. Boudreau (1987) defines utility analysis as the process of describing, predicting and explaining the usefulness or desirability of decision options and using that information in decisionmaking. Few personnel intervention programs are currently evaluated in utility terms, although the techniques are available. The only requirements necessary for implementing utility analysis are a set of decision options, attributes describing the characteristics of the options that affect the valued consequences and the pay-off function. The pay-off function should be defined by management and provide a system for combining the attributes to derive an estimate of desirability for each decision option. However, most practitioners/researchers fall back on the tried but not-so-true methods of correlational terms (Coefficient of Determination, Coefficient of Alienation, Index of Forecasting Efficiency) which mean little to the manager-decisionmaker.

As absolute personnel costs continue to climb as well as their proportion of total organizational expenditures, there will be an increasing demand for justification in terms of dollars and cents. Yet this demand must be counterbalanced with consideration of the purpose of the information request. Using utility analysis as a tool in the overall decisionmaking process provides the support for the decisionmaking system. Dollar-based decision systems (grounded in

utility theory) can meet this demand but proper implementation requires a collaboration between psychometrics and cost-accounting, an historically infrequent partnership. Human Resource Management and Finance should work together to develop a methodology to support decisions by management in regards to Human Resource policy. Presently, neither discipline has adequately responded to the challenge. This integrated, joint effort is essential to provide proactive thinking rather than a reactive response (Cascio, 1980). Human Resource Management as well as Finance perspectives should be modified to provide the necessary insight into personnel intervention programs in utility terms. "Instead of backing into the future, the real challenge lies in managing it effectively--based on rational consideration of the costs and expected payoffs of available alternatives" (Bennis, 1963).

APPENDICES

APPENDIX A

COVER LETTER

UNIVERSITY OF CENTRAL FLORIDA

DEPARTMENT OF PSYCHOLOGY

ORLANDO, FLORIDA 32816-0001 (305) 275-2216

May 11, 1987

I am a graduate student in the Industrial/Organizational Psychology Masters program at the University of Central Florida. I am writing my thesis on utility analysis. Utility analysis is defined as the determination of expected organizational gain or loss anticipated to result from various personnel interventions.

It is a challenge to today's Human Resource Management departments to justify their programs in dollar-value terms. My research involves the use of a utility model to estimate the economic value to the organization of a personnel program. The research population is first-level line accounting supervisory personnel. Through the use of the enclosed survey, I will develop an index of the variability of job performance in dollars for incumbent employees. The survey asks for three estimates of the value in yearly production of a given performance-level employee. The accounting supervisor's manager is instructed to use the cost of having an outside consultant firm provide the accounting supervision service as a guideline. The estimate is based on what it would cost to have the accounting supervision provided by an external organization. This value can then be used in a utility formula.

The respondents to the enclosed surveys should be the managers of first-level line accounting supervisors. First-level line accounting supervisors are defined as supervising four to twenty subordinate non-management clerical personnel. Accounting functions can include accounts receivable, accounts payable, revenue, asset management and general ledger. I am enclosing four surveys in the anticipation that your organization may have multiple accounting departments.

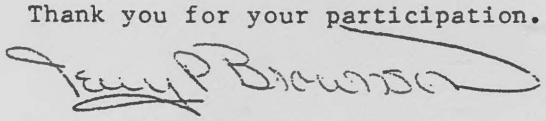
All responses will be confidential. This survey is being distributed to a total of 60 organizations in the state of Florida. A summary of the data will be provided to your organization at your request. The approximate completion time for this survey is twenty minutes.

I have enclosed a draft of a memo that you can use for the internal distribution of the survey. The survey can be returned to me at the following address:

Terry P. Brownson
614 Wilshire Drive
Casselberry, FL 32707

If you need additional information or would like to request a data summary, please contact me at home on (305)831-5107 or at work on (305)629-6010.

Thank you for your participation.



Terry P. Brownson

Enclosures

APPENDIX B

INTERNAL MEMO

Date

To: [Insert name of manager of first-level line accounting supervisor]

From:

Re: Survey for Industrial/Organizational Psychology Masters Thesis

The attached survey is part of a thesis being done by a student in the University of Central Florida's Industrial/Organizational Psychology Masters program. She is writing her thesis on utility analysis. Utility analysis is a method to determine the contribution, in dollar related value terms, of a personnel intervention program to the productivity of the organization.

The position which you are to consider when responding to the survey is the first-level line accounting supervisors that report to you. The first-level line accounting supervisor is defined as supervising four to twenty non-management clerical personnel. The accounting functions to be included are accounts receivable, accounts payable, payroll, revenue, asset management and general ledger.

All responses will be confidential. Your anonymity is assured and participation is voluntary.

The survey will take approximately 20 minutes. The survey is to be returned by May 22, 1987. Following completion of the survey, please mail in the self-addressed envelope provided. The survey is to be returned directly to :

Terry P. Brownson
614 Wilshire Drive
Casselberry, FL 32707

Ms. Brownson has requested that any questions on survey completion can be directed to her. She can be reached at home on (305)831-5107 or at work on (305)629-6010.

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